UNITED STATES DEPARTMENT OF AGRICULTURE

FARMERS BULLETIN

WASHINGTON, D. C. 700 JANUARY 18, 1916

AGR. DEPT.
29 MAY 1916

Contribution from the Bureau of Plant Industry, Wm. A. Taylor, Chief.

PECAN CULTURE; WITH SPECIAL REFERENCE TO PROPAGATION AND VARIETIES.

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ECONOMIC IMPORTANCE OF THE PECAN.

In 1909, according to the census reports of the following year, there were produced in the United States 9,890,769 pounds of pecans, valued at $971,596; 15,628,776 pounds of black walnuts, valued at $244,479; 22,026,524 pounds of Persian (English) walnuts, valued at $2,297,336; and 6,793,539 pounds of almonds, valued at $711,970. The value of the pecan crop, therefore, was approximately four times that of the black walnut, one-third greater than that of the almond, and less than one-half that of the Persian walnut.

In comparison with certain fruits the value of the pecan crop of 1909 was approximately one-ninetieth that of apples, one-thirtieth that of peaches and nectarines combined, one-ninth that of pears, one-eighth that of cherries, and one-quarter that of Florida oranges.

In the number of farms from which nut trees were reported this species easily takes first rank, as pecan trees were reported from 81,493 farms, black walnuts from 69,831 farms, Persian walnuts from 36,858 farms, and almonds from 13,095 farms. Therefore 16 per cent more farmers were engaged in raising pecans than black walnuts, 124 per cent more than Persian walnuts, and 523 per cent more than almonds.

The production of pecans more than trebled between 1899 and 1909, while that of Persian walnuts doubled, and that of almonds is shown to have decreased slightly during the same period.[1]

Taking into consideration with these figures the facts that pecan planting on a large scale and the introduction of intensive methods of cultivation were but fairly inaugurated when the census of 1910 was taken, that, while the major portion of pecan planting is near the Gulf of Mexico and the South Atlantic coast, with the exception of mountainous and low-land sections the pecan is more or less common over practically the whole southeastern quarter of the United States, and that the commercial production of the Persian walnut in this country is as yet limited to but small portions of two States (California and Oregon), it is at once apparent that the pecan is destined to become by far the most important of our nut-bearing trees.

NATIVE RANGE.

The pecan is an American species found only in certain parts of the United States and Mexico. Figure 1 is an outline map of the United States, showing the areas of the natural range and the districts within which it is now under cultivation. From this map it will be seen that with the exception of a small area in central Alabama, west of Montgomery,[2] the eastern boundary of the section to which the pecan is native is marked by an irregular line drawn southward across central Kentucky to central Tennessee; thence south and west to central northern Mississippi and southwest to central southern Louisiana; from this point the line parallels the borders of the Gulf of Mexico to southern Texas, without reaching the coast. In a line nearly parallel to that of the eastern border, the western boundary of its natural range extends from southwestern Iowa across eastern Kansas, western Oklahoma, and western Texas to the Rio Grande.

[1] As the production of almonds varies greatly from year to year, this is not an absolutely fair comparison.

[2] Mohr, C. The distribution of some forest trees in the Southern States. *In* Gard. and Forest, v. 6, no. 289, pp. 372–373. 1893.

CULTURAL DISTRIBUTION.

East of the Mississippi River and its northern tributaries the pecan has been introduced into most of those States to which it is not native, but it is only within certain localities that orchards of named varieties have attained bearing age. With the exception of the native trees occurring in western Kentucky, southern Indiana, southern Illinois, southeastern Iowa, and eastern Missouri, few pecan trees are found north of the latitude of lower Virginia. Annual crops from even the native trees are fairly uncertain north of the 39th degree of latitude, or about that of Vincennes. The pecan does not adapt itself to mountainous sections or to low lands where water

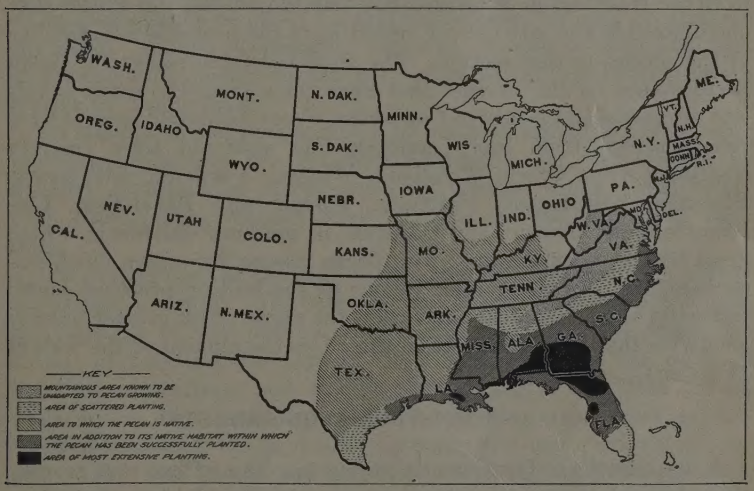

FIG. 1.—Outline map of the United States, showing the range of the pecan exclusive of occasional plantings in the Western States and scattered trees throughout the West and North.

stands on or near the surface of the ground for considerable periods. Few trees have been planted in the southern portion of peninsular Florida or in mountainous regions, but with these exceptions pecans are not uncommon in all the large areas of the southeastern United States.

Near the Gulf coast there are frequently found large trees whose evident age indicates that the planting of pecans in the Southern States to the east and south of the area of the natural range of the pecan has been in progress for more than a century. The planting of orchards of seedling trees began about 20 years after the Civil War. During the early nineties grafted and budded trees of named varieties were secured in sufficient numbers to permit the planting of occasional orchards of such trees, but comparatively few orchards of either seedlings or grafted trees were planted previous to 1900.

Since that time, however, especially during the last 8 or 10 years, the planting of pecan orchards in the Southern States has taken place at a continually increasing rate. In southern Mississippi, southern Alabama, central and southern Georgia, and northern Florida, large areas, frequently in orchards of several hundred acres in extent, have been planted to pecan trees.

In comparison with the activity in pecan culture of the Southern States the West has shown very little interest in this nut. Occasional small plantings may be found in certain parts of each of the three States bordering upon the Pacific. So far as the Department of Agriculture has been able to ascertain, the number of trees planted in either Washington or Oregon has been too limited and scattered to make possible any satisfactory report as to the probable adaptability of the species to that section. The most favorable reports of pecan performance on the Pacific coast have come from the interior valleys of central and northern California. Very favorable reports have been received from small orchards and scattered trees (mainly seedlings) from Chico, Woodland, Winters, Vacaville, Elk Grove, Stockton, Farmington, Patterson, Fresno, and Bakersfield, Cal. Reports from Anaheim and Whittier, in southern California, where great trouble is experienced with pecan rosette, have been much less encouraging. In the opinion of one of the leading practical horticulturists of the San Joaquin Valley, the pecan offers greater inducements for that particular section than does the almond or the walnut (Persian).

SOIL AND MOISTURE REQUIREMENTS.

A deep, fertile soil, sufficiently porous to admit of free root growth, well drained yet by no means dry, is considered best adapted to pecan culture. Localities in which the water table is within reach of the taproot seem to be preferred by the pecan. This fact is of such common belief with the well drivers of the semiarid portions of Texas that they seek proximity to pecan trees when boring for water. It is essential that the trees be not allowed to remain in standing water for any great length of time, although an occasional overflow to a depth of several feet apparently is beneficial rather than harmful.

The soils of certain localities are undoubtedly better adapted to pecan culture than those of others, but it is as yet impossible to pick the best soil or locality, notwithstanding the claims of enthusiastic land venders. With the exception of the southern half of Florida, where, as shown by figure 1, there are practically no cultivated trees, there are a sufficient number of promising thrifty young orchards in the southern halves of the States bordering upon the Gulf of Mexico

and the eastern halves of the South Atlantic States to give reasonable assurance of the commercial possibilities of the pecan in almost any fertile and well-drained portion of this area. However, there is as yet no indication that any one section is preeminently better suited to pecan growing than other general sections.

PROPAGATION.

WHO SHOULD ATTEMPT THE PROPAGATION OF PECAN TREES.

Pecans and other species of the same genus (Hicoria) are more difficult to propagate by budding or grafting than fruit trees. The inexperienced operator, therefore, must expect a very low percentage of successes as the result of his first attempts at budding or grafting the pecan. Skilled propagators, however, are now so successful that under favorable conditions the percentage of failures is no longer a matter of consequence.

No attempt to bud pecans should be made on rainy days or in early mornings following heavy dews. Extremely hot days should be avoided, especially if accompanied by drying winds. Moderately cool, cloudy days, without wind or rain, are best for pecan budding.

The propagation of pecan trees, like that of fruit trees, is a highly specialized industry. The selection and preparation of suitable soil, the choosing of seed and its proper care previous to planting, the details of planting, the care of the young seedlings, the work of budding or grafting, and, finally, the digging of the trees are all steps which require experience, and oftentimes the most experienced nurserymen are in doubt regarding the best methods to employ. The best results are attained where the quantity of stock grown is sufficient to permit the elimination of all inferior trees.

The importance of using well-grown nursery trees when establishing an orchard is so great and the possibility of the average man being able to raise good nursery trees is so doubtful that under ordinary circumstances it is far better to purchase stock from some reputable nursery. When trees of varieties suited to the particular section where the planting is to take place are not available, or sometimes when new varieties are to be first propagated, the planter, of course, must be his own nurseryman.

The instructions regarding methods of propagation which follow are intended not to inform the experienced nurseryman how to improve upon his methods, but to assist the beginner who of necessity is obliged to raise his own stock or who has trees for top-working. In general, the methods and principles used in pecan propagation are also applicable to the propagation of hickories and walnuts.

SEED SELECTION.

The experience of nurserymen throughout the entire pecan section indicates that plump-meated nuts of medium size from thrifty, productive, annual-bearing trees, free from disease, are the most desirable for seed purposes. It has also been the observation of these nurserymen that nuts from east of the Mississippi River usually have a higher and more prompt percentage of germination than those from Louisiana or Texas. It is generally conceded to be important that seed should be selected from a latitude equal to or north of that in which the trees are to be planted.

CARE OF THE SEED.

Pecans intended for seed should be retained previous to planting in as nearly as possible the condition of the nuts at the time of harvest. If the nuts become dry they should be thoroughly soaked before planting. If to be held over fall and winter for spring planting they should be placed in moist sand (technically speaking, "stratified") as soon as harvested, where they should be held at a low temperature in a dark place. They may be kept in a cellar or buried in the ground, as preferred, but in either case precaution should be taken to guard against rodents, fluctuating temperatures, and insufficient drainage.

PLANTING THE SEED.

Pecan seed may be planted soon after harvest or early in the spring. Fall planting does away with the need of stratifying the seed, but involves the risk of very considerable loss from winter injury and from mice or other rodents.

Germination is earlier, growth quicker, a better root system develops, and the trees are easier to dig when grown in sandy rather than in clay soils. Good drainage is also more easily effected in sandy soils, and for these reasons light soils are ordinarily preferable for nursery purposes. Irrespective of its nature, the land should be thoroughly prepared before the seed is planted. The soil should be fertile, well pulverized, yet firm. The nuts should be planted 2 to 3 inches deep and 8 to 12 inches apart in rows 4 to 6 feet apart and covered with firmly packed soil. A top-dressing of leaf mold or other light compost, 1 or 2 inches deep, will aid greatly in keeping the soil mellow and moist.

During the first season the growth of the pecan is confined largely to the development of a taproot, which is usually from three to five

times the length of the top. In ordinary seasons the growth above ground will not be more than 6 to 12 inches.

A method sometimes practiced is to plant from three to six nuts at the place where the tree is to stand in the orchard, with the intention of later budding or grafting the best seedling and removing all others. Those who advocate this method do so on the ground that to cut the taproot, as is customary in digging trees from the nursery, is detrimental to the tree and that a great saving of labor will be accomplished by not having to dig and transplant the trees.

In actual practice, however, planting the seed in place rarely proves satisfactory and is not recommended. Some of the reasons why it is unsuccessful are: (1) The young trees while but a few inches tall are exceedingly difficult to protect from injury by careless workmen when engaged in caring for such other crops as may be growing between the rows. (2) It frequently happens that none of the resulting seedlings develop into suitable stock for budding or grafting. (3) There is always a wide range in the length of time required for seedlings, even from the same parentage and under the same conditions, to attain the proper size for propagation purposes, and as a result the orchards so developed show a most undesirable lack of uniformity. (4) Transplanting tends to encourage the development of a fibrous root system and is therefore a benefit to the tree rather than a detriment.

Planting seed in place has been extensively employed by the growers of Persian walnuts in the State of California. Regarding it, however, the authors of a bulletin on the subject of walnut culture[1] say "without reservation" that "in no instance" do they know of this method proving "practical or satisfactory."

COMPARISON OF BUDDED AND GRAFTED TREES.

The pecan does not reproduce itself true to seed; it must be budded or grafted the same as are apples, peaches, oranges, and other fruits. The point of union between the stock and the scion should be at least 10 inches above the level of the ground, as it has been observed that trees having lower points of union are more often injured or killed during severe winters than are those with points of union well above the ground. As the bud is usually inserted 10 inches or more above ground and as grafts are usually below the surface, budded trees are preferred by most planters.[2]

[1] Smith, R. E., Smith, C. O., and Ramsey, H. J. Walnut culture in California. Walnut blight. Cal. Agr. Exp. Sta. Bul. 231, p. 211. 1912.

[2] Nurserymen find grafting to be more economical of labor than budding, as it is usually performed during the winter at a time when labor is plentiful and cheap. For this reason grafted trees are quite as common in the market as budded trees.

CLEFT GRAFTING.

One form or another of cleft grafting has been longer employed as a means of propagating the pecan than budding. It is performed either during the late winter months, just as the buds begin to swell, or very early in the growing period. At that time the upward flow of sap is most rapid and the union will be formed most quickly. Scions for grafting of all kinds should be selected from the growth of the previous season. Terminal twigs were formerly almost exclusively used and are still preferred by some propagators, but as the bud at the end of the branch rarely produces a strong shoot, ordinarily drying up and falling off instead, terminal twigs are no longer used to a large extent.

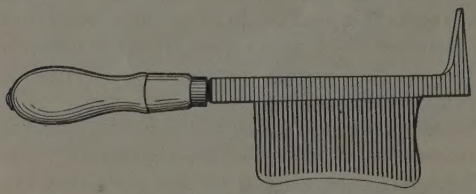

FIG. 2.—A tool specially designed for cleft grafting.

A sharp, fine-tooth saw, a sharp grafting knife, a specially devised grafting tool (fig. 2), a short-handled wooden mallet (fig. 3), a quantity of raffia and grafting wax or grafting cloth, and a number of scions constitute the necessary equipment for cleft grafting. In performing the operation of cleft grafting, the trunk or limb of the tree to be grafted (known as the stock) should be cut squarely across with the saw. The knife edge of the grafting tool should then be placed across the stock, either over the center or, preferably, to one side, in order to avoid the pith, and, by tapping the back of the tool with a mallet, split, or, better, cut the stock to a depth of 2 to 4 inches. Remove the tool and pry the two parts of the stock apart with the thick, narrow wedge projecting from the back of the grafting tool at the extreme end. Prepare the scion by sharpening its lower end with the grafting knife into the form of a wedge (fig. 4, *a* and *b*), made thicker on the side which will be outermost when in position (fig. 4, *c*). Insert the wedge end of the scion in the cleft of the stock so that the inner bark (the cambium layer) of its thick side will be in close contact with that of the stock. The scion should be pushed into the cleft until the cut surface of the stock is on a level

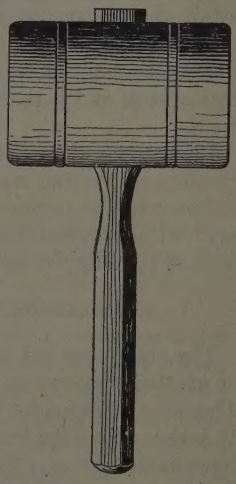

FIG. 3.—A mallet for use in cleft grafting.

with the base of the first bud. It will do no harm if it goes slightly deeper. It is imperative that the two cambium layers be brought together as closely as possible. With stocks of sufficient size a second scion may be similarly placed in the opposite side of the cleft. Re-

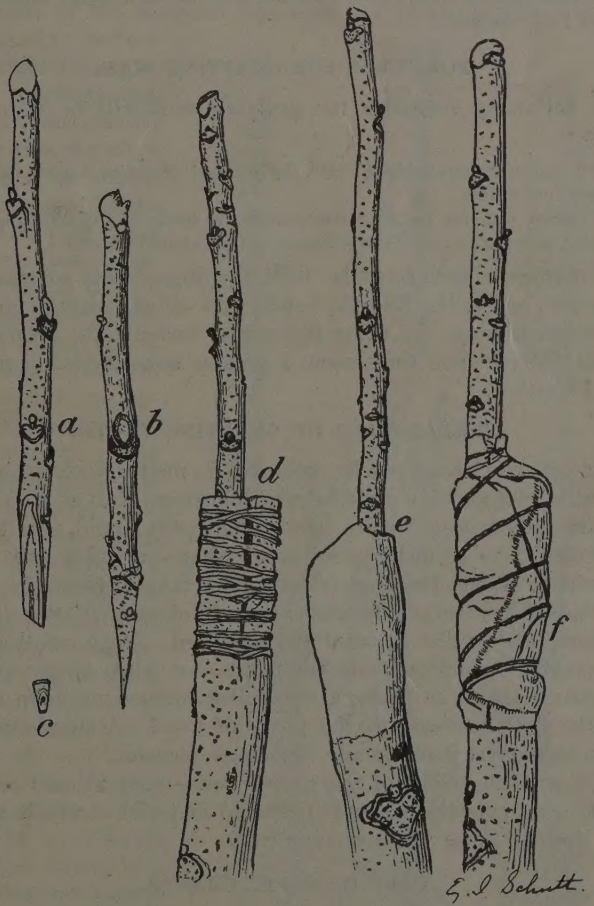

FIG. 4.—Cleft grafting. Successive steps in the operation: *a* and *b*, Views of the scion; *c*, cross section of the scion, thicker on one side; *d*, the scion in place and the stock securely tied to prevent splitting; *e*, the union covered with grafting wax; *f*, outer wrapping securely held with string.

move the iron wedge from the middle of the cleft and cover the cut surfaces, including the tip of the scions (unless terminal shoots have been used), with specially prepared grafting wax, being careful not to cover the buds. If the stock is weak and inclined to split further after the wedge has been removed, it should be tightly wound with

several wrappings of a stout, rather coarse material before the wax is applied. Where a large amount of grafting is to be done, the best as well as the cheapest material for wrapping is raffia, which can be obtained from dealers in nursery supplies. For propagation on a small scale cotton warp, strips of old muslin, or similar material will answer fully as well.

FORMULAS FOR GRAFTING WAX.

The following formulas for grafting wax will be found satisfactory:

1. Mix together thoroughly 4 parts (by weight) of rosin, 2 parts of beeswax, and 1 part of tallow.

2. A harder wax for use in warm weather is made of the following: Rosin, 4 pounds; beeswax, 1 pound; raw linseed oil, one-half to 1 pint.

To prepare either formula, melt the ingredients together, pour into water, and pull. Rub the hands with oil or grease before using, to prevent sticking. In using the second formula the proportion of oil will depend upon the season, a greater quantity being necessary in cool weather.

PREPARATION OF GRAFTING CLOTH.

Thin calico or cheap muslin saturated in melted wax, drained, and allowed to cool makes a material which answers both as a wax and as a binding substance. Before immersing in the liquid, tear the cloth into strips 12 to 18 inches wide or of whatever width may be most convenient. When thoroughly saturated, take it from the solution and while still warm remove the excess of hot wax. Various methods of accomplishing this removal are practiced. On a small scale the cloth may be wrung out with the hands, but when larger quantities of material are to be made, a convenient method much in use is to draw the cloth between two flat pieces of wood. A simple method is certain to suggest itself to any ingenious operator.

When grafting cloth of the proper consistency is used raffia will be unnecessary, as the properly prepared material carefully wrapped holds itself in place without being tied.

CARE OF CLEFT GRAFTS.

Obviously, two scions placed in one cleft double the chance of success. With an ordinary wrapping of waxed cloth, further attention to the graft itself will not be needed. If wound with stout material, the bandages should be severed as soon as growth has begun, when the weaker of the two scions should be cut away. If both scions are allowed to remain, the formation of a fork between the two will be inevitable and splitting will be very likely to follow. A single scion affords a much better opportunity for the development

of a symmetrical head, and there is less danger of crowding than when two scions are left.

NURSERY WHIP GRAFTING.

The operation of whip grafting is usually performed during the latter part of the dormant season at any point on the trunk from immediately below the surface to several inches underground. For this method of propagation the stock and the scion should be of very nearly the same size, preferably not more than three-fourths of an inch in diameter nor smaller than a lead pencil. With the knife held so as to make an upward stroke, cut the stock entirely across at a long angle, as shown at 1, figure 5. At about one-third the distance from the upper end of the cut make an incision parallel with the grain, as shown at 2, figure 5. Cut the scion at as nearly the same angle as possible and make a similar incision in the cut surface one-third the distance from the upper end of the cut, as shown at 3, figure 5. Push the cut surfaces together in such a way that the tongue of the scion made by the incision will be crowded into the groove made by the incision in the stock, as shown at 4, figure 5. Bind the two parts together with raffia or other material, as shown in figure 6 at *a* (not as appears at *b*), and pack firmly with earth. The use of wax is not necessary.

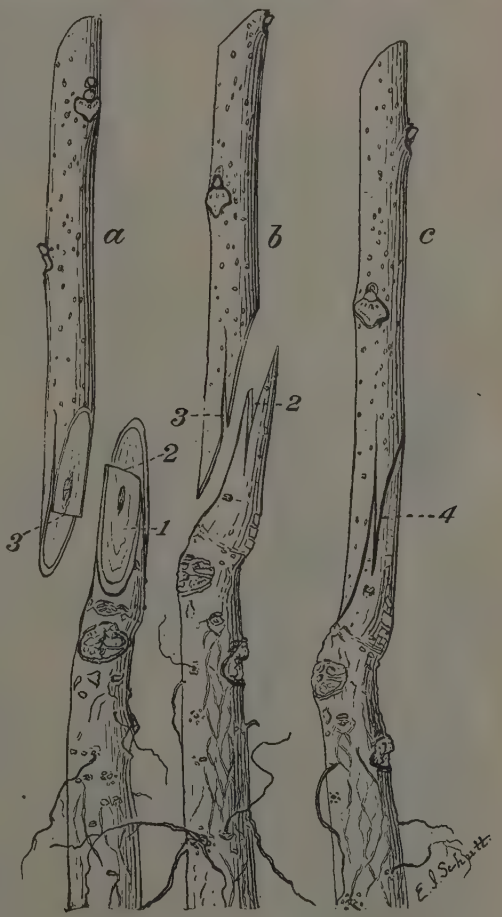

FIG. 5.—Whip grafting. Early steps in the operation: *a* and *b*, Front and side views of both stock and scion properly cut; *c*, stock and scion in position and ready for wrapping.

CARE OF WHIP GRAFTS.

Young trees worked by the whip-graft method will require little subsequent attention other than pruning and cultivation. While staking as a support to the union is not necessary, in ordinary cases the use of stakes will later be required to insure erect growth. It will be unnecessary to cut the bands, as with cleft grafts, as the moisture of the ground will cause the wrapping material to decay in the course of a few weeks.

FIG. 6.—Whip grafting. Later steps in the operation: *a*, Proper method of tying; *b*, improper method of tying; *c*, one year's growth following a successful union.

ANNULAR BUDDING.

Budding is more economical of propagating wood than is grafting, as a single bud of the variety to be reproduced answers the same purpose in budding that is served by a scion with two or three buds upon it in grafting. Budding permits the propagator to do a part of his work during the growing season, while grafting must be done at a season when the scions are yet dormant but just as the stock is starting into growth.

It is probable that more pecan trees have been propagated by annular budding, with its modifications, than by all other methods of propagation combined. The process is also known as "ring" and "flute" budding. It is performed during the midsummer months at such time as the bark is found to slip (peel) most readily. In some seasons this period may be very brief, lasting only a few

days, while in other years the time during which annular budding may successfully be performed extends over a period of several months. In the latitude of southern Georgia it is not uncommon

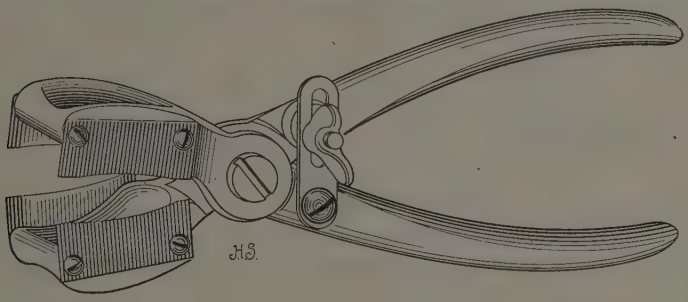

FIG. 7.—A metal tool specially designed for use in annular budding.

for this method to be employed from as early as May 10 until late in July or even in August. For the earliest budding, bud sticks cut while dormant and held in storage must be used. The first-

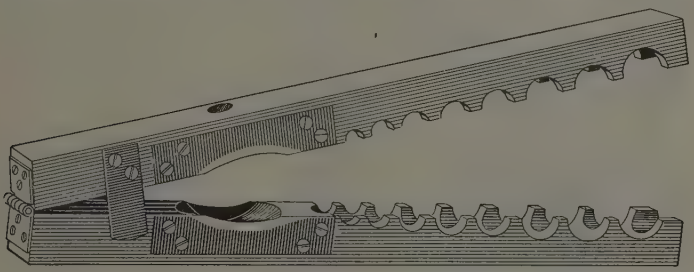

FIG. 8.— A tool with wooden handle and steel blades specially designed for use in annular budding.

formed buds of the current season's growth may be used during the latter part of the summer.

Annular budding consists in transferring a ring of bark cut from a bud stick[1] of the desired variety to which a bud is attached to the trunk or branch of another tree, to take the place of a similar ring of bark previously removed. Specially designed tools, such as are shown in figures 7, 8, and 9, have been devised for the purpose of cutting the rings. Two ordinary propagating knives having single blades may be fastened together and made to answer the pur-

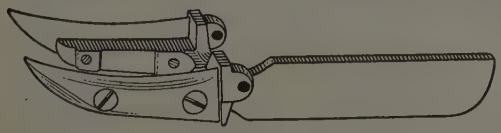

FIG. 9.—Another type of metal tool specially designed for use in annular budding.

[1] The bud stick is a branch, usually about 2 feet in length, cut from a tree of the variety to be propagated.

pose, but they must be securely held together or they will not work well. Cut a ring of bark from the stock with one of the tools, slit it with a single-bladed knife, and peel it off. Remove a similar ring carrying a dormant bud from the bud stick. The bark of the bud stick should be slit on the side opposite the bud. Immediately place this ring in the space left by removing the bark from the stock and wrap at once with waxed cloth, taking care not to cover the bud (fig. 10).

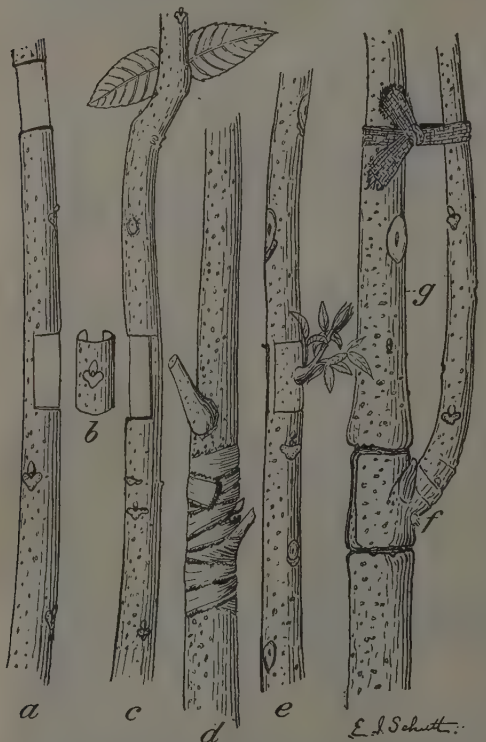

FIG. 10.—Annular budding. *a*, Bud stick from which the bud has been removed; *b*, the bud ready for insertion in the matrix of the stock; *c*, the stock ready to receive the bud; *d*, the bud after being placed in position and carefully wrapped; *e*, growth taking place, the wrapping having been removed; *f*, growth from the bud supported by being tied to the stock (*g*) above the union. Note the scars above the union, where the buds were removed in order to direct the flow of sap to the new bud.

PATCH BUDDING.

When the annular method is used it is necessary that the stock and scion be of nearly the same size. If the bud stick is slightly larger than the stock a portion of the bark to which the bud is attached may be cut away, so that the two ends of the ring just meet around the stock. If the bud stick is smaller than the stock, a strip of bark on the latter may be left in position to complete the ring. In actual practice, rings which extend only partly around the stock are most commonly used. This, however, is not true annular budding, because the use of a band of bark which extends only part way around the stock is merely a patch. It is to this modification of the annular method that the term "patch budding" has been applied. A tool specially designed for patch budding is illustrated in figure 11. It consists of four thin steel blades fastened together

in the form of a rectangle. The tool is used as a punch and cuts a segment of bark from the stock and from the bud stick five-eighths of an inch wide by 1 inch long.

A fair degree of success in patch budding by using an ordinary single-bladed budding knife is reported by skillful operators. The method followed is to cut from the bud stick a patch of bark about half an inch in width by three times as long, in the center of which is the bud. The piece of bark so outlined is removed from the bud stick and laid over that of the stock. Using this as a pattern, incisions are then made around it in the bark of the stock. The pattern is then removed, the section of the bark outlined in the stock is lifted, and the bark from the bud stick is put in its place.

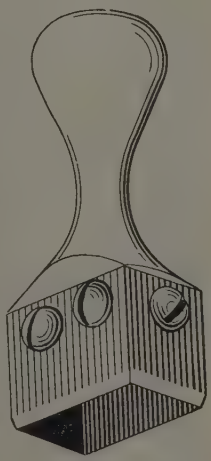

FIG. 11.—A metal tool specially designed for use in patch budding.

Some varieties of the pecan are more difficult to bud successfully than others; with such varieties the annular method or a near approach to it is generally most successful. With the average sorts, however, the tendency among the more experienced nurserymen is much inclined to favor the patch method, which may be performed with any of the tools illustrated in figures 7, 8, 9, and 11.

The buds best suited to annular or patch budding are those in the axils of the leaves at the base of the current season's growth. It is well worth the time required to clip the leaves away, close to the buds, 10 days or 2 weeks before the bud is wanted, for by so doing the wound will heal over before the bud is needed; otherwise, a serious lessening of the vigor of the bud through evaporation may take place.

CARE OF ANNULAR AND PATCH BUDS.

In annular budding the transplanted or substituted ring of bark sometimes unites with the stock promptly, permitting the upward flow of sap to proceed without much interference. When this is the case, the top should be carefully pruned back sufficiently to force the proper amount of sap into the bud to cause it to swell. This pruning should be done with great care, as surplus sap is likely to accumulate under the bark of the new bud and cause it to decay or, as it is termed, to "drown" the bud. If the tree is young and the growth has been rapid, precaution should be exercised in cutting back the top, in order not to expose the tender bark to the heat of the sun. Sufficient foliage should be left to serve as a protection from the hot sun. If the supply of sap be limited, it will be well to cut

out all buds in the top of the stock. All dormant buds, both above and below the new bud, should be rubbed off as soon as they begin to swell. The wrapping about the new bud must be cut as soon as growth begins. As the union made by a bud with a stock in any method of budding is at first merely the union of two pieces of bark and not of wood, it is necessarily weak during the first few months. To avoid the danger of breaking out at the bud, the new growth made from the bud should be provided with a support. For this purpose a temporary support may be provided by leaving a stub of the original top 8 or 10 inches long, entirely denuded of foliage (fig. 10, *g*), to which the new top may be tied. When no longer needed the dead stub may be cut away close to the union. However, stakes will be required for grafted trees and for early-budded trees. As in the former case, the operation will make it impossible to leave a stub on the stock, and in the latter the new growth will soon reach beyond the stub which might be left.

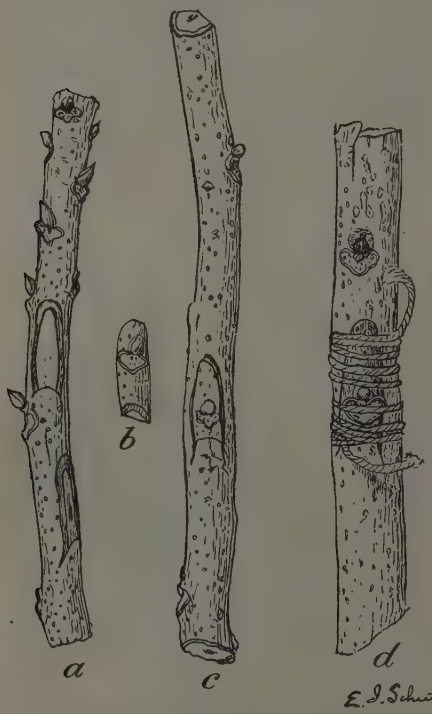

FIG. 12.—Chip or "dormant" budding. *a*, The bud stick; *b*, the bud ready for insertion; *c*, the bud inserted in the matrix of the stock; *d*, the bud securely tied in place.

CHIP BUDDING.

Propagation by chip budding is performed in the early spring or late in the dormant period. Because of being done at this season it is also known as "dormant" budding. With a sharp knife a downward cut is made below the bud on the bud stick to a depth of perhaps one-eighth of an inch. Raising the knife to a point above the bud, a long downward cut is made, which meets the lower

end of the first cut, and the bud is removed with a chip attached, as shown in figure 12. A similar chip is removed from the stock and the desired bud is put in its place. After setting the bud it should be carefully wrapped with such material as will hold the cambium layers of the stock and the bud firmly together on at least one side.

Subsequent treatment similar to that already described for annular and patch budding should be given.

LENGTH OF TIME TREES SHOULD REMAIN IN THE NURSERY.

In the Gulf Coast States seed nuts are ordinarily planted during the months of January and February. With conditions favorable for rapid growth, a large percentage of the young seedlings should be large enough to graft in 12 months and should be ready for transplanting by the end of the second season. If they are to be budded they should reach sufficient size for that purpose by the middle of the second season or when at the age of 18 months. Another period of equal length will be required for the trees to attain the desired size for transplanting. Under exceptionally favorable conditions grafted trees will be ready for planting in the orchard two years from the time of planting the seed, as compared with three years for budded trees under ordinary circumstances. In actual practice, however, comparatively few trees attain sufficient size for grafting until the end of the second season; the greater amount of grafting, therefore, is performed on roots that are at least two years old.

THE PRESERVATION OF NUT-BEARING FORESTS.

The value of pecan-producing forests has been recognized to such an extent that occasionally enterprising owners have taken steps not only to prevent further destruction of such forests, but also to increase their productiveness by a careful and systematic elimination of all unprofitable trees, so as to give the advantage to those producing superior nuts.

This work is well worthy of encouragement, but before undertaking it the owner should consider that it will mean the bringing of the forest trees into orchard form and that the conditions must be made as nearly like those of an orchard as possible, if orchard returns are to be realized. He must rid himself of any misconception that he may have to the effect that, being a native of the forest, the pecan tree will do better under forest conditions than under cultivation. He must also realize that the transformation of a forest in this manner will involve considerable time and expense and that unless carefully followed up it will not become a profitable venture.

As clearing the forests too suddenly will tend to expose the remaining trees to injury by high winds, the thinning-out process should be

brought about gradually. The least desirable pecan trees should be marked during the harvest period and subsequently removed. In selecting the trees to be kept, those with low heads should, as far as possible, be given preference, and tall spindling trees should be so pruned as to lower the head. Broken and weak limbs should be removed, so as to insure the symmetry and compactness of the tree, but care should be taken in pruning in order not to leave to heal over larger wounds than may be necessary. A coat of paint or wax should be applied to all large cut surfaces. As the new tops begin to assume definite form in later years, further improvement by pruning should continue, but this remodeling should be done so as to cut as few large limbs as possible.

In order to secure the best results from a native pecan grove it may be advisable to top-work a portion or all of the trees. If so, scions of the best standard sorts grown in the locality should be selected. If, however, such scions are not available or if the forest is in a locality where standard sorts have not demonstrated their adaptability, scions may be selected from the best individual trees in the forest itself.

In selecting the trees to be retained it is best to choose those least affected by disease, those with nuts which are uniform in character and quantity, those which bear early and regularly, and those which shed the nuts promptly when mature. Vacant spaces in the wood lot should be filled by planting nuts from the best trees, or, better, by planting budded or grafted trees of suitable varieties. The natural grove should be given cultivation, irrigation if necessary, and fertilization where necessary, the same as an orchard of nursery-grown trees. A pecan forest (fig. 13) near San Antonio, Tex., illustrates what can be accomplished by such treatment.

TOP-WORKING.

The importance of top-working as a means of changing the tops of pecan and other nut or fruit trees can hardly be overestimated. By this method seedlings and trees of unsatisfactory varieties may be quickly transformed into bearing trees of more valuable kinds, new varieties may be hastened into bearing, untried sorts may be quickly tested in new localities, several sorts may be tested on one tree, and varieties grafted to uncongenial stocks may be given a new trial by being transferred to other trees. Seedling orchards scattered over the entire pecan area, as well as wild trees, both in the forest and in the open, are being transformed in this manner.

TREES SUITABLE FOR TOP-WORKING.

Top-working can be successfully done on either the pecan or the hickory, and one may be grafted on the other. But, notwithstand-

ing the fact that both the pecan and hickory belong to the same botanical family as the walnut and the butternut, the relationship is too distant to permit the successful grafting of the pecan or hickory upon stocks of either the walnut or butternut. The grafting of the hickory is discussed under another heading.

It is possible to top-work pecan trees of practically any size or age, but the advisability of attempting so to transform giant trees or those that have begun to deteriorate with age is very doubtful. Top-working is of greatest value to healthy trees under 30 years of age.

FIG. 13.—A pecan forest near San Antonio, Tex., in process of transformation into a grove by the elimination of all trees other than the most desirable pecans. Note the distance between the trees.

HOW TO TOP-WORK.

Top-working is done while the tree is in a dormant condition. At that time little danger of killing the trees by severe pruning is incurred. With the exception of a few branches which should be left to carry on the vegetative processes of the tree while the development of the new top is in progress, the top should be cut back to the point at which it is desired the new head should be formed. Usually three or four of the lower limbs are left for this purpose. If a large number of trees are to be worked over, an elevated platform of convenient height, mounted on a wagon, will prove a great

convenience to the operator. If the limbs to be cut are large, wind a heavy chain about the branch immediately below the place of cutting, in order to obviate the danger of splitting. A shallow cut on the lower side of the limb will further tend to reduce this danger. Trunks more than 6 inches in diameter heal more slowly than those of smaller size; whenever avoidable the larger trunks should not be cut. Figure 14 illustrates a tree properly cut back, and figure 15 shows one which was cut back too severely. The top may be cleft grafted as it is cut back, or new growth may be allowed to start, to be budded in midseason by one or another of the methods above described. Three healthy scions or buds properly located will be

FIG. 14.—Seedling tree cut back during the dormant season to induce new growth for to budding.

enough to insure a symmetrically formed top on a small tree. As soon as the new growth reaches sufficient size to utilize the entire flow of sap, the remaining branches of the original top should be removed. Figure 16 shows a 7-year-old tree which was cut back in February, 1908, and budded August 10 of the same season, the lower branches of which were removed September 1, 1909. The four spurs below the branches indicate the points at which the branches were cut away. These spurs were later pruned closely during the dormant season.

Figure 17 shows a large well-shaped tree near Morgan City, La., top-worked when about 25 years old and photographed six or seven

years later. The points at which the grafts were made are indicated by the right-angular unions, more or less distinct in each branch. An objection to top-working large trees lies in the fact that the new head must be formed considerably higher than the old, with the danger that it will be too high. This is especially true with varieties such as the Stuart, Jewett, and others which are inclined to upright growth. If the original top is already high, it is generally best to cut back and graft the lower branches a year before cutting away the central part of the top. Enough of the top may be cut back at the same time to force a liberal supply of sap into the graft. The sap can not be directed to the lower limbs in this manner if the higher limbs are grafted first, for in that case pruning will be fairly certain to disturb permanently the symmetry of the new top.

FIG. 15.—A seedling pecan tree too severely cut back for top-working.

TOP-WORKING THE HICKORY WITH THE PECAN.

Because of their close relationship scions and buds of the pecan readily unite with stocks of the hickories. The advantages sought in such operations are the quick introduction of the pecan into localities to which it is not common but where hickories abound, the conversion of trees bearing inferior nuts into desirable ones, and the possibility of discovering a stock for the pecan better suited to a certain locality than those ordinarily used. A number of species of hickory are known to have been tried. In southern Louisiana several trees of the water hickory (*Hicoria aquatica*) in standing water produced a healthy, strong pecan top, but later died outright, while others of the same species not top-worked remained alive under the same conditions; another of these trees taken up and transplanted to drier land made a good growth and according to latest reports was bearing satisfactorily. In Florida, where the mockernut (*Hicoria alba*) is common, the pecan has been found to unite readily with it and to make a rapid growth until the diameter of the pecan becomes equal to that of the hickory, after which it grows much more slowly. Other

hickories have been tried, but while the early growth is generally reported to be strong and rapid very few have thus far proved satisfactorily fruitful.

FIG. 16.—A 7-year-old pecan tree top-worked with Stuart scions. The seedling top was cut back in February, the buds were inserted August 10, and the lower branches removed September 1 of the next year. Note how the head of the tree has been elevated.

As hickory trees top-worked with pecans usually stand in out-of-the-way places, not uncommonly in wood lots, it is still doubtful

whether the reason for unfruitfulness is entirely due to the influence of the hickory stock or to the lack of cultivation.

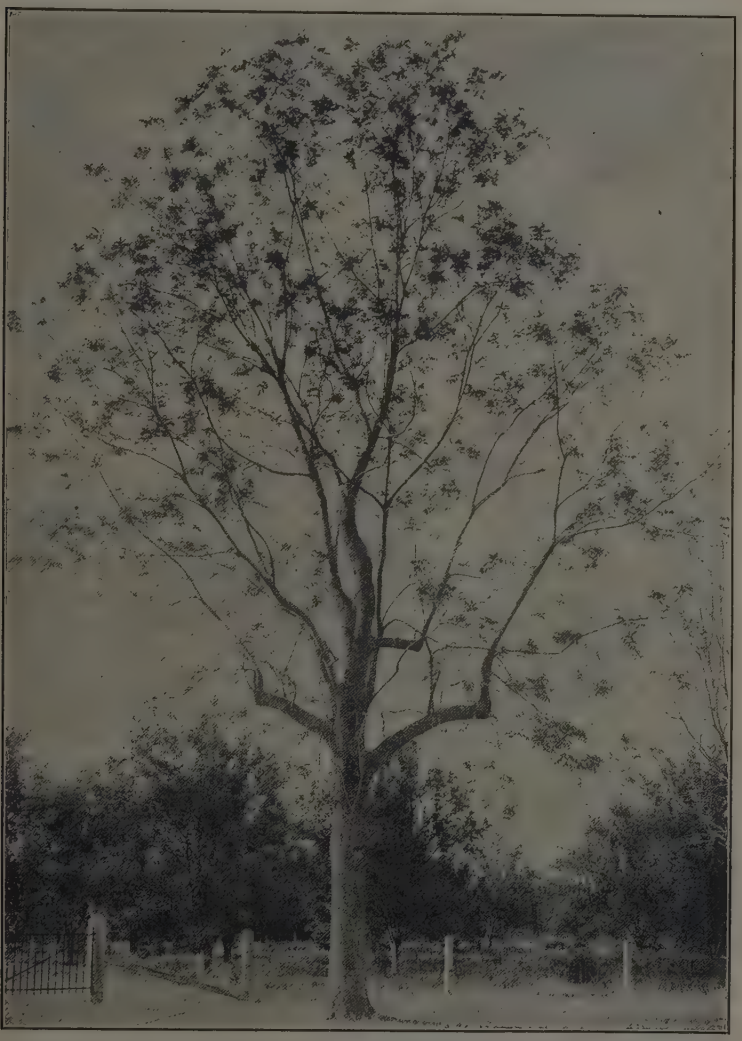

FIG. 17.—Pecan tree in Morgan City, La., top-worked when about 25 years old and photographed 6 or 7 years later. A very well-shaped tree, although headed rather high.

PLANTING.

TIME AND DISTANCE.

Nursery trees are usually transplanted to their permanent orchard location during January or February. Before planting the trees,

the soil should be put in good condition by thorough cultivation and, if necessary, properly drained.

The distance for planting varies in different localities. In the deep alluvial lands of Louisiana and the Mississippi Valley, where it is expected that the trees will attain greater size than when grown in the lighter soils of the more eastern States, pecans are now being set at distances varying from 50 to 75 feet. Some planters, having in mind the idea that 100 feet will be the most suitable distance when the trees reach maturity, are planting at 50 feet, with the intention of removing the alternate trees as soon as crowding begins, leaving them eventually 100 feet each way.

In Georgia a distance of 46 feet and 8 inches each way (20 trees to the acre) was adopted for some years, but as the orchards so set approach maturity it is becoming evident that a considerably greater space would have been better. These planters now agree that 60 feet apart (12 trees to the acre) is not too great a distance.

TREES SUITABLE FOR PLANTING.

As has been explained, nursery-grown trees are usually planted at the age of 3 years. While sometimes sold as though graded according to age, they are actually graded according to size. If sold under the age grade the largest trees are naturally the "oldest." For this reason it is much more satisfactory to buy according to size, although in that case there is danger of slow-growing stock being worked into the lot. Within reasonable limits a nursery-grown pecan tree which has reached a given size in a given length of time is much to be preferred to one which has been twice as long in attaining the same size. It is natural to expect that the rapidity or slowness of growth displayed in the nursery will be relatively the same throughout the life of the tree. For this reason the healthy quick-growing trees in the nursery are preferable to those which grow slowly. The standard grades of pecan stock now in use are 1 to 2 feet, 2 to 3 feet, 3 to 4 feet, 4 to 5 feet, and 5 to 7 feet, these measurements applying to the top only, as the length of the taproot is not taken into consideration. Ordinarily, trees of the larger sizes are much to be preferred, although it is doubtful whether the extremely large trees (those of more than 7 feet) would be as desirable as those of 4 to 7 feet.

The taproot, which it was once thought necessary to protect in transplanting, is now cut off about 2 feet below the surface. In a nursery[1] visited during the fall of 1910 a tool specially designed for the purpose was being used in cutting off the taproot.

[1] The Monticello Nurseries, Monticello, Fla.

Purchasers of nursery stock should insist that the trees be allowed to remain in the nursery in the fall until all growth has ceased and the foliage has fallen normally. The early autumn demand for trees has frequently impelled nurserymen to dig a great portion of their trees while still in full leaf. At that season neither the top nor the root system is in a condition to be disturbed. The cutting away of foliage, branches, and roots while the sap is still in circulation results in a heavy shock, which is injurious and wholly unnecessary. It is therefore highly important that every buyer of southern varieties of pecan trees grown in the South should insist that the trees be not dug until the leaves have dropped naturally, which is seldom earlier than the middle of November. With northern varieties the situation may be different, as the wood of these varieties matures very much earlier. However, with southern varieties grown in the South it would be better for the trees not to be dug from the nursery rows before the last of November in any season.

SETTING THE TREES.

Extreme precaution should be taken to prevent the roots from becoming dry. They should be kept moist and carefully covered from the time they are dug until finally set. A large hole, fully twice or three times the size actually required to receive the roots, should be dug. A quantity of well-rooted compost or nitrogenous fertilizer placed in the bottom of the hole, entirely covered with earth before setting the tree, will furnish plant food during subsequent seasons and tend to induce a deep root system. The immediate contact of the roots with compost or fertilizer of any kind must be avoided. All broken parts of the roots and all lateral branches of nursery-grown trees should be pruned away. Soaking the roots in a bucket of water for an hour or two, or even over night, gives the trees a very great advantage. The trees should be placed in the hole at about the same depth they stood in the nursery. Spread out the roots carefully with the hands and pack firmly with moist surface soil thoroughly pulverized. If the soil is dry, it should be drenched with water while the hole is being filled.

CULTIVATION.

Satisfactory tree growth and bearing qualities can be expected only in return for careful attention to cultivation and orchard management. In addition to being unsatisfactory in bearing, neglected trees are likely to be subject to attacks of fungous diseases and insect pests.

A common practice in the Southern States is that of renting the land between the rows to tenants, reserving a narrow strip on either

side of the row to be cultivated and fertilized by the owner. As the trees approach bearing age this strip is widened until all the land is included, after which cover crops only are grown between the rows. A good many soils in which pecan trees are now being planted are of such low fertility that they should be replenished with plant food rather than further impoverished with intercrops. Of the crops being grown between the rows cotton and corn are the most common, although truck crops are not infrequent. Legumes, such as cowpeas, velvet beans,[1] lespedeza, and bur clover, are most commonly used for soiling purposes.

BEARING AGE.

It is not unusual for trees of some varieties when grown under very favorable conditions to mature a few nuts by the end of the second or third season after transplanting from the nursery to their permanent orchard location. A few nuts, however, can not be counted a crop. It is not improbable that such early bearing is detrimental to the vitality of the trees. As a general thing, unusual precocity of a variety closely associates itself with defectiveness in some other respect. The Mobile, for example, is one of the earliest to come into bearing, but after the first few crops a very high percentage of the nuts fail to develop plump kernels. Oftentimes the kernel will be lacking entirely. Another example is the Teche, which, like the Mobile, begins bearing at a very early age, but which is inferior in the flavor and richness of its kernel.

As a general rule it may be said that commercial returns are not being realized in less than 10 to 12 years from the time of planting the trees.

PRESENT PRICES OF THE NUTS.

The price per pound paid to the grower of wild nuts is an exceedingly variable factor. A decade and a half ago these nuts were little in use except at holiday times, and the prices to the producer were such that but a small portion of the crop was actually gathered, 3 cents a pound then being considered a fair price.

The increased consumption since that time, which, without doubt, is largely due to the introduction and use of machines for cracking pecans, has caused a rise in price to a maximum of 25 cents per pound for the wild nuts, which is reported to have been reached in 1912. The average price is probably between 10 and 15 cents per pound.

The demand for pecans of the named varieties which has been created by nurserymen, fancy confectioners, tourists, a few seedsmen,

[1] The velvet bean is a remarkably vigorous grower, and special precaution should be taken to prevent it from running over the young pecan trees, causing them to break down with the weight of the vines.

and real-estate dealers has made prices of 1 to 3 cents a nut not unusual.

Increased production is now forcing the named varieties into competition with other nuts and with the wild product, the kernels of which may be bought at retail at from 60 to 90 cents per pound, as is evidenced by the quotations of Schley at 45 cents, Van Deman and Delmas at 40 cents, Stuart at 35 cents, and Alley at 30 cents, which were made during the fall of 1914 by Chicago wholesalers to the trade. It appears probable that further declines in prices will follow during the next few years, as production increases.

MARKETING PECANS.

The limited production of pecans thus far has made it comparatively easy for the grower, with the aid of the express and mail-order service, to act as his own middleman. He will probably continue to do so to a considerable extent, but the young orchards now approaching maturity promise so to increase the production in the very near future that other methods of marketing with vastly greater capacity must soon be devised.

Foreseeing this, a small group of growers is now endeavoring to organize an exchange, patterned after the exchanges in other parts of the country. These growers have undertaken to develop a system whereby prompt disposal of the product may be assured at a minimum of expense and, subsequently, to enlarge and shorten the channels between the places of production and those of consumption.

The individual growers have already accepted the pound as the standard unit of measure, but as yet very few have agreed upon a standard package, and with but very few exceptions none have adopted a private trade-mark.

THE SELECTION OF VARIETIES.

No factor in pecan culture is of greater importance than the selection of varieties for planting. Upon it alone may depend the success of the orchard. The following general suggestions are intended to be of service to the prospective planter:

1. Ordinarily, varieties do not readily adapt themselves to soil and climatic conditions differing widely from those common to their place of origin.[1] Unless varieties have already demonstrated their

[1] Evidence of this statement lies in the fact that when taken to the more humid climate of the Eastern States a number of the leading varieties (including San Saba, Sovereign, Kincaid, and Halbert) which originated in the semiarid portions of Texas have developed a marked degree of susceptibility to the fungous disease known as pecan scab. Furthermore, experience thus far has not been such as to encourage the planting of eastern varieties in the semiarid portions of the Southwestern States or of southern varieties in the North other than as an experiment. Northern varieties have not yet been tried in the South to any great extent.

adaptability to the soil and climatic conditions in a given locality they should be tested experimentally before being planted commercially.

2. As far as practicable, varieties which have proved to be at least fairly resistant to fungous diseases and insect pests should be selected.[1]

"PAPERSHELL" PECANS.

With reference to the pecan, the term "papershell" has been extended in its application until it is now practically without significance. Originally applied to those types of pecans having such thin shells that one could easily be cracked when two were crushed together in one hand, the term during recent years has been made to include all cultivated varieties, many of which have fully as hard shells as the average wild nuts. Properly speaking, the term "papershell" never referred to a particular variety; its correct application has been only with reference to varieties having very thin shells.

VARIETIES.

Since the introduction of named varieties of pecans, which may be said to have begun about 1890, approximately 100 different sorts have been advertised by one or more nurserymen. Of these, many were so inferior that already they have been forgotten. There are other sorts which because of their inferiority have been discarded by the leading pecan orchardists, but which are still being listed by certain nurserymen. There are still other sorts which have been tried in but a limited number of localities and which, therefore, are too new for general recommendation.

There are a number of standard sorts which have now been under test in a sufficient number of localities and whose performance has been such as to justify their recommendation for further planting in those localities and in others having apparently similar climatic and soil conditions.

Of the varieties which, because of their past performance, are not considered as being worthy of commercial planting in any section, the following are a few: Appomattox, Atlanta, Beveridge, Centennial, Hadley, Hall, Hodge, Jacocks, Jewett, Krak-Ezy, Magnum, Olustee, Rome (syns. Columbian, Twentieth Century, Pride of the Coast, etc.), and Senator.

Varieties now considered best for planting in the plains sections of southeastern Virginia and eastern North Carolina are the Stuart, Mantura, Van Deman, Moneymaker, Schley, Pabst, and James.

[1] It is highly improbable that any variety will ever be discovered which will be altogether immune under all conditions to fungous diseases or insect pests, but some varieties are known to be less subject to certain diseases than others, and considerable evidence at hand indicates that some are less affected by certain insect pests than others.

Varieties which may be recommended for eastern South Carolina, eastern and central Georgia, central Alabama, and central Mississippi are the Schley, Stuart, Van Deman, Moneymaker, James, and Carman.

Varieties for planting in south Georgia and north Florida are the Schley, Curtis, Bradley, Alley, Van Deman, Stuart, Moneymaker, President, Pabst, and Russell.

Varieties for central and north Florida: Curtis, Bradley, Kennedy, President, Schley, Van Deman, and Moneymaker.

Varieties for the coastal section of Alabama, Mississippi, and Louisiana: Schley, Curtis, Alley, Van Deman, Russell, Stuart, Pabst, Success, and Havens.

Varieties for east Texas: Very few sorts have been given a fair trial in this section. The varieties here mentioned are recommended very largely because of their performance farther east. They are the Stuart, Moneymaker, Schley, Curtis, Van Deman, Bradley, Carman, and James.

Varieties for west Texas: Sovereign (syn. Texas Prolific), Kincaid, Colorado, San Saba, Halbert, and Burket.

Varieties for northern Louisiana, southern Arkansas, and northern Mississippi: Very few sorts have been given a fair trial in this section. The following varieties are mentioned because of certain evidence of superior hardiness which they have shown and the general merit of the nuts themselves, but they are recommended for conservative planting only: Moneymaker, Carman, Stuart, Van Deman, Schley, Pabst, and Success.

Varieties for the section including central and western Tennessee, central and western Kentucky, southern Indiana, southern and southwestern Illinois, eastern and southern Missouri, southeastern Kansas, Oklahoma, and northern Arkansas: Only varieties of northern or local origin should be considered for planting in this general area, as none of the southern sorts are sufficiently hardy to justify their recommendation. The best of these are the Major, Niblack, Indiana, Busseron, and Posey.

DESCRIPTIONS OF VARIETIES.

The following characterization of varieties is taken largely from Bureau of Plant Industry Bulletin No. 251, entitled "The Pecan," issued in 1912. The most inferior varieties are not included in the list.

Alley.
From Jackson County, Miss. Widely disseminated since being introduced in 1896; size medium; shell thin; kernal plump; flavor good; a medium to heavy bearer and a symmetrical, vigorous grower, somewhat subject to scab under certain conditions.

Aurora.
From Mobile County, Ala. Not yet propagated to a great extent; size large; shell somewhat thick; partitions rather corky; kernel fairly plump; flavor good to very good. Probably adapted to markets catering to large nuts.

Beman.
From Hancock County, Ga. Propagated to a limited extent only. Size below medium; shell rather hard; kernel plump, bright colored, rich, and of excellent flavor. Very productive. Promising for north Georgia and vicinity.

Bidwell.
From Butte County, Cal. First propagated in 1913. Size medium; shell thin, cracking quality excellent; kernel plump; rich and of very good flavor. Believed to be of especial value for planting in the Sacramento Valley.

Bolton.
From Jefferson County, Fla. Size above medium; shell moderately thin; kernel not always plump; flavor fairly good. Bearing record not proved. Needs further testing.

Bradley.
From Baker County, Fla. Size below medium; shell of average thickness, hard; kernel plump; flavor very good. Very productive. Especially promising for Florida and south Georgia.

Burkett.
From Callahan County, Tex. Size large; shell thin; kernel plump; flavor excellent. Said to be productive. Should be especially adapted to planting in west and central north Texas.

Busseron.
From Knox County, Ind. Not widely disseminated thus far, but believed to be especially promising for the northern range. Nuts closely resemble Indiana, of which the Busseron may be the parent.

Claremont.
From Concordia Parish, La. Not yet extensively propagated. Size medium; shell somewhat thick; kernel plump; quality rich; flavor excellent; very productive.

Colorado.
From San Saba County, Tex. Little propagated as yet. Size large; shell somewhat thick; kernel plump; quality rich; flavor excellent. A seedling of San Saba. Probably especially adapted to planting in western Texas.

Curtis.
From Alachua County, Fla. Size below medium; shell thin; kernel plump; cracking quality excellent; quality rich; flavor excellent. Very productive. Widely disseminated. Popular in Florida.

Daisy.
From Comal County, Tex. Widely disseminated, though not extensively planted. Size medium; shell moderately thin; cracking quality not good; kernel plump; quality rich; flavor very good. Tree vigorous; said to be productive. Probably best adapted to western Texas.

Delmas.
From Jackson County, Miss. Widely disseminated. Size large to very large; shell moderately thin; kernel plump; quality good to very good; flavor excellent. Tree vigorous; productive. Very much subject to scab under certain conditions.

Frotscher.
From Iberia Parish, La. Widely disseminated. Size large; shell very thin; kernel moderately plump, often dark colored; quality fair; flavor medium. Popular in southwestern Georgia and parts of Louisiana. Very free from disease. Generally reported as being a shy bearer.

Georgia.
From Mitchell County, Ga. Size above medium; shell thick, rather hard; kernel plump; quality good; flavor pleasant. Very prolific but extremely subject to scab in most places where tried. Should be avoided for the present.

Greenriver.
From Henderson County, Ky. Propagation recently begun. Size somewhat below medium; shell of average thickness; kernel plump; quality rich; flavor excellent. A promising variety, especially for northern planting.

Halbert.
From Coleman County, Tex. Widely disseminated, mainly by scions used in top-working. Size small; shell very thin; kernel unusually plump; quality rich; flavor excellent. Very prolific. Especially adapted to planting in western Texas and places of similar climatic conditions.

Havens.
From Jackson County, Miss. Not widely disseminated. Size medium to large; shell very thin; one of the best crackers; kernel usually plump; quality good; flavor sweet, though sometimes slightly astringent. Promising for Gulf coast planting.

Indiana.
From Knox County, Ind. Not yet widely disseminated. Considered highly promising for planting in the northern range. Size medium; shell of average thickness; quality and flavor very good. Prolific.

James.
From Madison Parish, La. Not widely disseminated. Size medium; shell thin; cracking quality excellent; quality rich; flavor sweet. Very prolific. Promising for the northern portion of the range of southern varieties. According to the introducer, this variety is highly subject to scab at Mound, La.

Kennedy.
From Alachua County, Fla. Not widely disseminated. Size medium to large; shell moderately thin; quality very good; flavor sweet. Very productive in some years. Inclined to be irregular. Especially adapted to central and northern Florida.

Kincaid.
From San Saba County, Tex. Well disseminated in central and western Texas. Size large; shell of medium thickness; kernel plump; quality very good; flavor sweet. Very prolific. Especially recommended for western Texas. Very much subject to scab in the Atlantic States.

Major.
From Henderson County, Ky. Recently introduced. Not yet widely disseminated. Size slightly below medium; shell thin; kernel unusually plump; quality rich; flavor excellent. Considered especially promising for planting in the northern range.

Mantura.
From Surry County, Va. Size medium to large; shell thin; kernal not always plump at tip, somewhat shrunken; quality good; flavor good. Said to be productive. Promising for the northern range of southern varieties.

Mobile.
From Mobile County, Ala. Well disseminated, especially in southwestern Georgia. Size medium to large; shell moderately thin; kernel sometimes plump, though frequently very defective; quality fair; flavor fair; very productive, but thus far generally objectionable after second or third full crop because of the great percentage of defective kernels. Not recommended for extensive planting in any section.

Moneymaker.
From Madison Parish, La. Widely disseminated. Size medium; kernel fairly plump; quality fair; flavor sweet. Very prolific. Especially suited to planting in the northern range of the area adapted to southern varieties.

Moore. SYNONYMS: *Long Moore, Moore No. 1, Moore No. 2.*
From Jefferson County, Fla. Size below medium; shell of average thickness; quality fair; flavor fair. Unusually productive and one of the earliest to mature. Well suited to northern Florida.

Nelson.
From Hancock County, Miss. Size very large; shell thick; kernel occasionally plump, though usually very defective; quality medium; flavor good. Tree unusually vigorous; very productive. Not recommended for extensive planting in any section.

Niblack.
From Knox County, Ind. First propagated in 1913. Size somewhat below medium; shell moderately thick; cracking quality excellent; kernel plump, somewhat dry; quality good; flavor very good. Parent tree very productive. Promising for the range of northern varieties.

Norton.
From Pike County, Mo. Size medium; shell moderately thick; cracking quality fair; kernel plump; quality rich; flavor sweet. Promising for the range of northern varieties.

Pabst.
From Jackson County, Miss. Widely disseminated. Size large; shell somewhat thick; kernel usually plump; quality good; flavor sweet. Generally productive, though by some thought not to be an early bearer.

Posey.
From Gibson County, Ind. Propagation but recently begun. Size medium; shell thin; cracking quality excellent; kernel fairly plump; quality rich; flavor sweet. This is probably the easiest to crack of any of the northern varieties yet named. Promising for the range of northern varieties.

President.
From Duval County, Fla. Well disseminated in northern Florida. Size medium; shell of medium thickness; kernel plump; quality good; flavor pleasant. Vigorous and productive. Considered as especially promising for central and northern Florida.

Randall.
From Alachua County, Fla. Not widely disseminated. Size large; shell rather thick; kernel plump; quality rich; flavor sweet. Prolific, though irregular in bearing. Evidently well suited to central and northern Florida.

Reuss.
From Ascension Parish, La. Not yet disseminated. Size slightly below medium; shell very thin; kernel plump; quality good to very good; an excellent cracker. Evidently promising, especially for the northern range of the area adapted to southern varieties.

Robinson.
From Orange County, Fla. Not widely disseminated. Size large; shell rather thick; kernel fairly plump; quality good; flavor pleasant. Very productive. Evidently promising for planting in the southern limits of the Florida area adapted to pecans.

Robson.
From Jackson County, Miss. More or less widely disseminated, though not well known. Size medium; shell thin; kernel somewhat shrunken; quality good; flavor pleasant. From same parentage as Russell, resembling that variety in many respects.

Russell.
From Jackson County, Miss. Widely disseminated. Size medium; shell very thin; kernel somewhat shrunken; quality good; flavor sweet. Prolific. Said to be sensitive to cold weather.

San Saba.
From San Saba County, Tex. Very well known. Size small; shell unusually thin; kernel very plump; quality very rich; flavor excellent. Highly productive. Especially adapted to western Texas. Not suited to eastern planting.

Schley.
From Jackson County, Miss. One of the best known and most widely disseminated varieties. Size medium to large, although often variable even on same tree; shell very thin; kernel plump; quality very rich; flavor excellent. Moderately productive, but a regular bearer. Although sometimes quite subject to scab it is one of the most popular varieties at the present time.

Sovereign. SYNONYM: *Texas Prolific.*
From San Saba County, Tex. Size large; shell of medium thickness; kernel plump; quality rich; flavor sweet. Unusually prolific. Especially well adapted to planting in western Texas. Not adapted to the Eastern States.

Stuart.
From Jackson County, Miss. More extensively planted than any other variety. Size medium to large; shell of average thickness; cracking quality not good; kernel plump, usually breaking into crumbs while being separated from the broken shell; quality good; flavor sweet. Moderately productive. Has succeeded in nearly all parts of the range adapted to southern varieties east of central Texas.

Success.
From Jackson County, Miss. Of comparatively recent introduction. Size large to very large; shell moderately thin; kernel usually very plump; quality rich; flavor very good. Generally reported to be highly prolific.

Taylor.
From Harrison County, Miss. Known for some time, but not widely disseminated. Size medium to large; kernel plump; quality very good; flavor sweet. Evidently well adapted to Gulf coast planting.

Teche.
Thought to be from Iberia Parish, La. Introduced by confusion with Frotscher. Size medium to small; shell of average thickness; kernel fairly plump; quality medium to poor; lacking in flavor. Unusually productive and generally hardy over the entire range of southern varieties from Louisiana eastward. The quality of the kernels of this nut compares favorably with that of the average wild nuts of Louisiana.

Van Deman.
From St. James Parish, La. One of the most widely disseminated of all varieties. Size large to very large; shell of medium thickness; kernel plump; quality rich; flavor sweet. Very popular until recently, when it developed a susceptibility to scab, which is serious in some sections.

Warrick.
From Warrick County, Ind. Not yet generally disseminated. Size slightly below medium; shell moderately thin; kernel usually plump; quality rich; flavor excellent. Parent tree reported to be prolific. Evidently a very promising variety for planting in the northern range.

Waukeenah. SYNONYMS: *Round Moore, Moore No. 1, Moore No. 2.*
From Jefferson County, Fla. Quite generally disseminated in northern Florida. Size small; shell of average thickness; kernel generally shrunken; quality below medium; flavor fair. Very prolific. One of the earliest to mature. Especially adapted to central and northern Florida.

Young.
From St. Martin Parish, La. Widely disseminated, but not extensively planted. Size large; shell very thin; kernel somewhat shrunken; quality good; flavor sweet. Possibly parent to Russell, which it resembles closely.

Zink. SYNONYM: *Big Z.*
From Jackson County, Miss. Recently introduced. Much like Frotscher in nut characteristics. Size large; kernel often shrunken; quality good. Though of attractive appearance, because of its deficiency in plumpness of kernel it should be held as a variety to be further tested.

WASHINGTON: GOVERNMENT PRINTING OFFICE: 1916